

Discussion on Implementation of the Water Framework Directive and Related Implications for the Metalliferous Mining Industry

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Abstract

The implementation of the Water Framework Directive (WFD) requires that draft River Basin Management Plans (RBMPs) are published by end 2008 and finalised by end 2009. Whilst the mining industry does not have to meet the terms of the WFD directly, there will be criteria within the RBMPs that the mining industry will have to comply with. This will likely take the form of negotiated discharge standards incorporated into Pollution Prevention and Control (PPC) permits. In some countries achievement of the objectives of the WFD may be hindered by the presence of orphan sites left from historical mining.

Introduction

The implementation timetable of the Water Framework Directive (WFD) requires that, *inter alia*, draft River Basin Management Plans (RBMPs) are published by the end of 2008, to be finalised by the end of 2009. These will include Environmental Objectives (EOs) which are expected to be met by the end of 2015, at which point a second phase of RBMPs and EOs leading to 2021 will be established. Whilst the mining industry does not have to meet the terms of the WFD directly, there will be criteria within the RBMPs and associated EOs that the mining industry, together with other producers of emissions to the water environment, will have to comply with. This will likely take the form of negotiated discharge standards incorporated into Pollution Prevention and Control (PPC) permits. This paper explores and discusses some of the strategic water management implications that this process might have for the metalliferous mining industry, and how these also relate to water management impacts from other legislation and guidance. The role of organisations such as the International Commission for the Protection of the Danube River (ICPDR) is also addressed.

Water Framework Directive objectives

The EU Water Framework Directive 2000/60/EC came into law in December 2000, with an implementation schedule spread over several years, leading to a planned achievement of the environmental objectives of the first RBMPs by 2015. A 'Daughter' Directive on Groundwater 2006/118/EC came into law in January 2007, and another on 'priority substances' for establishment of environmental quality standards (EQSs) is in process. The WFD will replace (or has replaced) a number of earlier directives concerning water quality and aquatic ecosystems. The WFD seeks to ensure protection and sustainable use of water resources at the river basin level by maintaining and improving the aquatic environment to at least 'good water status' and, in the case of groundwater, reversing any significant and sustained upward trend in pollutant concentrations. It also contributes to the progressive reduction of emissions of priority substances to water, with the ultimate aim of elimination of 'priority hazardous substances'.

The WFD is aimed primarily at aquatic ecology, because, *inter alia*, this is a better integrated indicator than discrete chemical sampling, and the selection of EQS priority substances (to populate Annex X of the WFD) is focussed on those chemicals that have the most significant potential impacts on aquatic life. These are similar to the List I substances from the Dangerous Substances into the Aquatic Environment Directive 76/464/EC, which will be repealed in favour of the WFD in 2013. Accordingly they principally cover a range of pesticides and other hydrocarbons, and ecologically significant heavy metals. The latter are of obvious relevance to the mining industry, and amongst the list of 'priority hazardous substances' being proposed (and intended for elimination under the WFD) are cadmium and mercury. Lead and nickel may be added following ongoing research and consultation.

It should not be overlooked however that other pollutants specifically referred to in Annex VIII of the WFD, whilst not included as 'priority substances', nevertheless include cyanides, arsenic and all other metals. Furthermore, the 'Daughter' Groundwater Directive 2006/118/EC, required under Article 17

of the main WFD, establishes parameters for which threshold concentration values in groundwater will apply. These thresholds, if exceeded, will indicate a risk to the achievement of good groundwater chemical status, and parameters include arsenic, cadmium, lead, mercury, and sulphate. The last potentially brings into the WFD additional measures for control of acid rock drainage (ARD) in groundwater even in the absence of arsenopyrites for example. Threshold values must first be established with the draft RBMPs by December 2008, and can be specified at the level of 'body of groundwater' (i.e.a subset of aquifer) if appropriate. In terms of the quality objectives of the WFD, for surface waters this requires the achievement of 'good' status in respect of both ecology and chemistry. Ecologically 'good' status means in general that aquatic biology elements show *low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with ... undisturbed conditions* (Annex V); chemically 'good' status requires compliance with the EQSs set for the priority substances. For groundwaters, 'good' status contains both quantitative elements (seeking to maintain a balance between sustainable abstraction and recharge for example) and chemical elements including absence of saline intrusion, compliance with thresholds set in the Groundwater Directive, and not compromising the objectives of any surface waters that the groundwater body is in contact with.

Clearly chronic and ongoing pollution from past mining activities, or even 'natural' drainage from mineralised areas could significantly compromise the WFD objectives without some degree of flexibility in implementation. This is taken account of in Article 4 and discussed further below.

River Basin Management Plans (RBMPs)

So far, EU Member States have been required to submit baseline reports of their defined river basins and associated groundwater bodies, including characterisation studies, a review of the pressures on water status from human activity, an economic analysis of water use, and a register of protected areas. If not already in place, monitoring programmes should by now be in operation. These 'Article V' reports will form the basis on which the RBMPs are developed. The EU have monitored Member State progress and compliance with these reporting requirements in its communication COM (2007) 128 of March 2007. RBMPs have to be drafted by EU Member States by the end of 2008 and finalised by the end of 2009. These are the 'meat' of the WFD, and will define the EQS values for each river basin and the proposed means (e.g. revised emission limit values) to be adopted to achieve good water status by 2015.

Implementation factors relevant to the mining industry

Article 10 of the WFD requires all discharges to surface waters to be controlled by the end of 2012, by means of emission controls based on best available techniques, relevant emission limit values or, in the case of diffuse impacts, best environmental practices. This accords with the provisions of the PPC Directive 96/61/EC. PPC permits will form the principal direct mechanism by which the impact of active mining operations on the aquatic environment, in pursuit of the objectives of the WFD, will be regulated. What is more challenging will be the measures adopted by Member States to manage and control emissions from closed and unmanaged (and especially orphan) sites including contaminated land, waste dumps and tailings ponds. This is a particular problem in the former Soviet block countries where past environmental management was inadequate or absent altogether, and where current resources (both in experienced personnel and financial) may be limited.

Direct discharges to groundwater are prohibited except for some circumstances where such discharges may be authorised, provided such discharges do not compromise the achievement of the EOs established for that body of groundwater. These circumstances include (Article 11, 3(j)):

- Injection of water containing substances from ... mining activities, and injection of water for technical reasons, into geological formations from which (minerals) have been extracted or into geological formations which for natural reasons are permanently unsuitable for other purposes. Such injections shall not contain substances other than those resulting from the above operations.
- Reinjection of pumped groundwater from mines ... or associated with ... civil engineering works.

Article 11, 3(l) refers to measures required to prevent significant losses of pollutants from technical installations, and to prevent and/or reduce the impact of accidental pollution incidents arising from floods. For metalliferous mining operations these measures are likely to mirror and reinforce provisions for water and hazardous materials management already in place, such as via the Mine Waste Directive. Further consideration of other factors relevant to the mining industry has emerged with the proposed WFD ‘Daughter’ Directive on Environmental Quality Standards. These include:

Substance	AA-EQS Inland Surface Waters	MAC-EQS Inland Surface Waters
Cadmium	<0.08 (Class 1) – 0.25 (Class 5)*	<0.45 (Class 1) – 1.5 (Class 5)*
Lead	7.2	n/a**
Mercury	0.05	0.07
Nickel	20	n/a**

AA = annual average, MAC = maximum allowable concentration

All values are µg/l (dissolved).

* for cadmium, the EQS values vary with water hardness, between <40 mg/l as CaCO₃ for Class 1, and > 200 mg/l as CaCO₃ for Class 5.

** not applicable for reasons of additional protection against short-term pollution peaks.

Notwithstanding the above, if natural background concentrations are higher than the EQS value, or if hardness, pH etc affect metal bioavailability, then Member States may take this into account when assessing monitoring results. Article 3 of the draft EQS Directive recognises that the EQS may not be met for a distance below the point of a discharge. This is acceptable provided that this does not compromise the compliance of the remainder of the water body. These transitional zones shall be identified in the RBMPs, and furthermore their extent shall be progressively reduced through the instrument of successive stricter PPC permits. Article 4 of the WFD allows for the extension of the timetable for achievement of good status (otherwise by 2015), provided that there is no further deterioration, if at least two of the following apply:

- Technical feasibility dictates that phased improvements exceed the timescale
- Disproportionate cost
- Natural conditions do not allow for timely improvement

The RBMPs must justify any extensions in compliance timescale, which will in any event be limited to two further updates of the RBMP, i.e. to 2027, *except in cases where the natural conditions are such that the objectives cannot be achieved*. This last point is very important in areas subject to natural drainage from highly mineralised areas, however there is likely to be considerable debate over the extent to which ‘natural’ conditions may or may not have been exacerbated by past or current mining activities.

The Mine Waste Directive

The Mine Waste Directive 2006/21/EC, whilst directed mainly at mining activities ‘upstream’ of WFD compliance points and addressed by PPC permits, nevertheless incorporates considerable requirements concerning water management which are crucial to the WFD. These include the requirement for operators to draw up waste management plans (Article 5) which contains in (f) a closure plan and (g) the need for measures for the prevention of water status deterioration; the requirement for approved closure plans is reiterated in Article 12, and in Article 13 the Member State is required to satisfy itself that these plans and associated measures will prevent any deterioration in current water status.

Cyanide

Cyanide is listed as a pollutant in Annex VIII of the WFD, but is not included as a priority substance. It will therefore be managed as an emission via PPC permits and any other discharge standards as part of the compliance process determined by the RBMPs. The Mine Waste Directive reduces cyanide concentrations in slurries admitted to tailings ponds to 10 mg/l WAD CN, and for context EU drinking water standards (and the standard for surface water intended for drinking) are 50 µg/l.

Transboundary factors and non-EU Members

Major river basins such as the Rhine and Danube cross national boundaries. The WFD requires that RBMPs for transboundary basins are developed in a properly coordinated fashion, and also that efforts are made to include non-Member States in cases where river basins extend into them. In the case of the Danube basin, which covers a large proportion of central and eastern Europe, this is coordinated by the International Commission for the Protection of the Danube River (ICPDR), a body that predates the WFD and EU membership of many of the states in the Danube basin. Through the ICPDR, agreements have been made with non-EU Member states to comply with the WFD as if they were members. Countries such as Serbia have therefore submitted Annex V Reports in the same way as Member states.

Conclusions

The Water Framework Directive is a major and ambitious piece of legislation that will have far-reaching impacts on our water quality and the sustainable use of water resources. Metalliferous mining activities do not have to comply with the WFD directly – that is for Member States – but the provisions adopted to comply with the WFD will undoubtedly filter back to mining operations via emission control standards, PPC permits and compliance with the Mine Waste Directive. There is some potential for flexibility in the implementation timescale of the WFD, to extend the deadline for achievement of good water status by 2015, in particular in respect of waters draining mineralised areas which have naturally elevated concentrations of metal pollutant substances. Such extensions will have to be justified in the RBMPs.

Mining companies (and their representative bodies such as Euromines) should therefore scrutinise the draft River Basin Management Plans due to be published at the end of 2008 very carefully.

One of the more challenging aspects of the WFD will however be in relation to orphan contaminated sites in countries with limited resources to rehabilitate them, such as Romania and Bulgaria. Whilst outside the control of current and future mining activities which operate in full compliance with environmental standards, the mining industry's image may yet be impacted if WFD compliance is compromised by the legacy of a contaminated past.

References

- Council Communication Towards sustainable water management in the European Union – first stage in the implementation of the Water Framework Directive 2000/60/EC (COM (2007) 128 final of 22.3.2007)
- Council Directive 76/464/EC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (OJ L 129, 18.5.76, p.23)
- Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (OJ L 257, 10.10.1996, p.26)
- Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p.1)
- Council Directive 2006/21/EC of 15 March 2006 on the management of waste from extracting industries and amending Directive 2004/35/EC (OJ L 102, 11.4.2006, p.15)
- Council Directive 2006/118/EC of 12 December 2006 on the protection of groundwater against pollution and deterioration (OJ L 372, 27.12.2006, p.19)
- Proposal for a Council Directive on environmental quality standards in the field of water policy and amending Directive 2000/60/EC (COM (2006) 397 final of 17.7.2006)